

REMARKS

Claims 1-14 are pending.

Claims 1-14 are rejected.

Claims 1, 9 and 11 are amended.

Claims 2, 5, 8 and 10 are cancelled.

Claims 1, 3-4, 6-7, 9 and 11-14 are pending.

Amended Claims

Claim 1 is amended to require that the aqueous suspension is sewage sludge. Basis is found in claim 2. Claim 1 is further amended to define the first flocculant as in claim 10 and to require that the second flocculant is a cationic polymer having an intrinsic viscosity of at least 3 dl/g. Basis may be found in claim 5.

Claim 9 is brought into compliance with claim 1 by elimination of options (ii) and (iv) and amending option (iii) such that the intrinsic viscosity is at least 4 dl/g. Basis for this amendment may be found on page 11, lines 10 to 13.

Accordingly claims 2, 5 and 10 are cancelled.

Claim 11 is amended to depend from claim 1 and to make the antecedent basis clear the term "polymer" is changed to "first flocculant". Basis may be found in original claim 10, now cancelled.

No new matter has been added.

35 USC 112, second paragraph

Claims 1, 8 and 9 are rejected under 35 USC 112, second paragraph. In claim 1, a intrinsic needs to be changed to "an intrinsic". In claim 8 and 9 examiner believes the terms 0.5 dl/g and 1 dl/g appear to be misdescriptive because claim 1 is drawn to "at least 3dl/g".

Claim 8 is cancelled and claim 1 has been amended to require both the first and second flocculant have an IV of at least 3 dl/g. Claim 9 is amended to delete options (ii) and (iv) and the remaining options require polymers of at least 4dl/g.

The applicants believe the above amendments overcome the 112, second paragraph rejections.

35 USC 102(b)

Claims 1-3, 6-11 and 14 are rejected under 35 USC 102(b) as being anticipated by Soresen, US 5,846,433.

The examiner believes Soresen to anticipate. Soresen teaches two stage addition of coagulant and then flocculent. The coagulant is added first and used as an indicator of the efficiency of the dewatering process conditions. The flocculent is added second. The examiner believes the flocculent may be added as dry particles.

The applicants wish to point out the differences between Soresen and the present claims.

Firstly,

Soresen teaches in col. 7, lines 52-59:

The polymers used in the invention are usually formed of water soluble monomer or monomer blend and are themselves water soluble. However flocculant polymer introduced in the form of small particles (below 10 microns) may be used while part at least of it remains in particulate form, for instance as a result of being cross linked. Suitable polymer of this type are described in more detail in EP 202780.

The passage in Soresen et al at column 7, lines 52 to 59 does state that the flocculant polymer introduced in the form of small particles (below 10 μm) may be used while part of it remains in particulate form, for instance as a result of being cross-linked. However, this does not state that these particles are dry. In fact cross-linked particles although hydrophilic and water at swellable in an aqueous medium would not dissolve and therefore remain as particles. Such particles may be prepared by reverse-phase emulsion polymerisation and then before use inverted into water to provide an aqueous dilution in which the cross-linked polymer remains as particles. Such particles would not be dry.

The subsequent paragraph of Soresen reveals that the addition of the coagulant and the flocculant may be made in conventional manner and states that the flocculant may be added as a flocculant solution typically having a flocculant content of 0.03 to 0.5% by weight. Therefore it would be quite reasonable to interpret the previous paragraph in this context in that the flocculant would be added in the form of an aqueous composition albeit containing particles that inevitably would not be dry.

Therefore Soresen does not disclose the addition of dry particles to the suspension.

Secondly, Sorensen et al does not disclose flocculant solutions as high as 2%.

Thirdly, the present application requires that the first additive is a flocculant whereas the first additive in Sorensen et al is a coagulant.

With regard to the coagulant as the first treatment aid it is evident from the whole disclosure of Sorensen et al that the terms coagulant and flocculant refer to different entities. Furthermore, in column 6, lines 54 to 69 it is stated that the cationic coagulant can be inorganic such as a salt of a polyvalent metal and even when the coagulant is polymeric, it would have very low molecular weight. Generally such polymers would cause coagulation by charge neutralization but have insufficient molecular weight that would enable the polymer to perform as a bridging flocculant. This is consistent with the description in Sorensen et al which states that the polymeric flocculant functions primarily by a bridging mechanism (see column 3, lines 64 to 65).

Fourthly, Sorensen et al does not disclose a thickening step between the addition of the two flocculants.

With regard to the essential thickening step of the present invention it is stated on page 6, lines 1 to 3 that the suspension is first thickened following the addition of the first flocculant and it is then explained that thickening involves the initial flocculation and release of water to produce the thickened suspension. It is generally understood by those skilled in the art of solids liquid separation processes that thickening always requires the release of free water.

Although Sorensen et al does indeed refer to thickening (see for instance see for instance column 3, lines 16 to 22) within the definition of this document, it is the whole process which either results in thickening or mechanical dewatering to produce a cake. Thus the thickening step would be after the flocculant (second additive after the coagulant) and not after the coagulant but before the flocculant.

Therefore in summary Sorensen et al differs from the present claim 1 as amended in the following respects:

- no disclosure of the addition of the second flocculant in the form of dry particles or aqueous composition having a polymer concentration of at least 2% by weight;
- no disclosure of the addition of a first flocculant but instead a coagulant;

- no disclosure of thickening the suspension between the first additive flocculant and a second flocculant additive.

Therefore present claim 1 as amended is not anticipated by Sorensen et al.

35 USC 102(e)

Claims 1 to 3, 6 to 11 and 14 are rejected as being anticipated by Weir et al US 7070696. The Weir PCT published (Oct. 17, 2002) more than one year before filing of the present application (Feb. 28, 2005). Thus the published PCT, would be a 102(b) reference and could not be overcome by a declaration.

The present claims require addition of the second flocculant as dry particles or as a 2 wt. % solution. There is no such suggestion in Weir.

In regard to the dry particles, Weir discusses U.S. 4,943,378 which comprise crosslinked water insoluble, water-swellaable polymeric particles that have a dry size of below 10 microns. In one embodiment these particulate flocculants may be made by blending a dissolved polymer with a particulate, generally insoluble polymer, which polymer may be made from the same monomers and differing only in the degree of cross-linking.

While Weir teaches the preparation of polymer a) and b) in almost any form polymer b) is preferably an aqueous preparation of a water in oil emulsion or a polymer in oil dispersion, or an aqueous preparation of a solid grade polymer. Weir does not teach addition of substantially dry polymer particles to the suspension.

Furthermore, Weir never suggests the addition of the second polymer at any concentration above 1.0% (col. 3, lines 13-16).

As the present claims require the addition of the second polymer in either substantially dry particulate form or in concentrations of at least 2 % by weight when applied as dissolved or hydrate polymer, and Weir does not teach the same, Weir does not anticipate.

Additionally, Weir et al also does not disclose that the first flocculant brings about thickening of the suspension and nor does Weir et al disclose mechanical dewatering to form a cake.

With regard to the essential thickening step of the present invention the specification of the present application explains that thickening involves the initial flocculation and release of water to produce the thickened suspension as stated above.

In column 2, lines 39 to 53 of Weir et al it is indicated that although the second polymer may be added after flocculation has commenced it should be added before the dewatering step or any high shear stage. There may also be some degree of mixing between the addition of the first and second flocculant. Nevertheless there is no suggestion that there should be a thickening stage, that inevitably involves the removal of water, between the addition of the first and second polymers. Furthermore, it is clear from the only example that no thickening stage was employed between the two polymer additions. Therefore it can be seen that Weir et al is completely silent on thickening between the first and second flocculants.

With regard to mechanical dewatering Weir et al makes no disclosure about the type of dewatering employed. In fact in the example sewage sludge is treated with a first flocculant and a second flocculant and then allowed to drain through a sieve such that free drainage may be measured. Such free drainage is not mechanical dewatering. Weir et al makes no disclosure with regard to mechanical dewatering.

Thus, Weir et al differs from the present claim 1 as amended in the following respects:

- no disclosure of the addition of the second flocculant in the form of dry particles or aqueous composition having a polymer concentration of at least 2% by weight;
- no disclosure of thickening the suspension between the first additive and a second flocculant additive;
- no disclosure of mechanical dewatering.

Therefore the instant invention of claim 1 is not anticipated by Weir et al.

35 USC 103(a)

Claims 1 to 14 are rejected as being unpatentable over Weir et al and Sorensen et al in view of Ghafoor et al US 6001920.

The examiner believes that Sorensen and Weir differ from the present invention by virtue of the concentration of the second flocculant as an aqueous composition being at least 2% by weight.

Examiner believes Ghafoor et al to disclose at column 6, lines 24 to 28 that it is known to use a polymer concentration of 5% by weight. However, this concentration relates to the **combined** quantity of cationic coagulant and flocculant. In the present invention the definition of the second flocculant is to a concentration of at least 2%. It is impossible to determine the concentration of only the flocculant in Ghafoor from the disclosure of a combined concentration of both flocculant and coagulant of 5%. Ghafoor does not appear to identify specifically the concentration of flocculant.

Ghafoor et al makes no suggestion that its composition can be employed in a two-stage flocculation process.

However, the assessment for obviousness should take into account the other differences the present invention has from each of Sorensen et al and Weir et al.

As stated above Sorensen et al differs from the present claim 1 as amended in the following respects:

- no disclosure of the addition of the second flocculant in the form of dry particles or aqueous composition having a polymer concentration of at least 2% by weight;
- no disclosure of the addition of a first flocculant but only a coagulant;
- no disclosure of thickening the suspension between the first additive and a second flocculant additive.

Ghafoor et al does not disclose a two-stage process involving both a first flocculant and a second flocculant and Ghafoor et al does not disclose an intermediate thickening stage. Accordingly Ghafoor does not make up for the deficiencies of Sorensen.

Therefore even if the skilled person were to modify Sorensen et al according to the teachings of Ghafoor et al the resulting process would involve a coagulant followed by the diluted composition of Ghafoor having between 0.1 and 5% **combined** flocculant and coagulant. There is nothing to guide the skilled person to specifically applying a composition containing dissolved or hydrated flocculant polymer at 2% by weight and there is nothing to guide the skilled person to applying a flocculant instead of the coagulant of Sorensen and there is nothing to guide the skilled person to a thickening stage between the two additions.

As stated above Weir et al differs from the present claim 1 as amended in the following respects:

- no disclosure of the addition of the second flocculant in the form of dry particles or aqueous composition having a polymer concentration of at least 2% by weight;
- no disclosure of thickening the suspension between the first additive and a second flocculant additive;
- no disclosure of mechanical dewatering.

Ghafoor et al does not disclose mechanical dewatering and does not disclose an intermediate thickening stage in addition to not suggesting a two-stage process.

Even if the skilled person were to modify Weir et al according to the teachings of Ghafoor et al the skilled person is not guided as to which polymer of Weir et al should be replaced. Therefore the skilled person could equally apply the composition of Ghafoor to either the first stage or the second stage. Even if the skilled person replaced the second flocculant there is nothing in Ghafoor to guide the skilled person to apply a thickening stage between the first and second additions and nothing to guide the skilled person to apply mechanical dewatering after the addition of the second polymer. Furthermore, there is nothing to indicate in Ghafoor that specifically the flocculant concentration should be greater than 2% by weight as opposed to a combined concentration of coagulant and flocculant of 5%.

Therefore claim 1 is not rendered obvious over the disclosure of Sorensen et al and Weir et al in view of Ghafoor et al.

Double Patenting Rejection

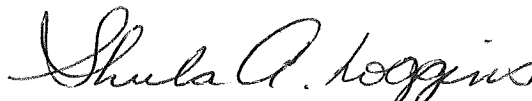
Applicants wish to put off the filing a terminal disclaimer until the other issues are resolved and applicants know the final state of the claims. At that time, applicants can better evaluate the suitability of filing a terminal disclaimer.

Reconsideration and withdrawal of the rejection of claims 1, 3-4, 6-7, 9 and 11-14 is respectfully solicited in light of the remarks and amendments *supra*.

Since there are no other grounds of objection or rejection, passage of this application to issue with claims 1, 3-4, 6-7, 9 and 11-14 is earnestly solicited.

Applicants submit that the present application is in condition for allowance. In the event that minor amendments will further prosecution, Applicants request that the examiner contact the undersigned representative.

Respectfully submitted,



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